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EXAMINER

CLARK, GREGORY D

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



### DETAILED ACTION

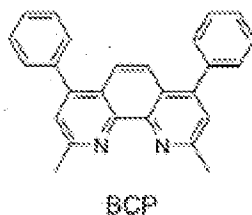
The examiner acknowledges the receipt of the applicants' amendments dated 02/24/2010. Claims 1, 3-22, and 25-28 pending.

Rejections and objections made in previous office action that do not appear below have been overcome by applicant's amendments and therefore the arguments pertaining to these rejections/objections will not be addressed.

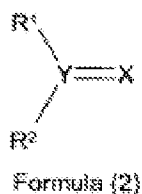
### Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. **Claims 1, 3, 5-18 and 25-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Tominaga (US 2003/0168970).**
2. **Regarding Claim 1**, Tominaga discloses an organic electroluminescent device containing an anode, cathode (abstract) and a matrix material (4, 4'-bis (carbazol-9-yl) biphenyl (CBP)) (paragraph 117) doped with a phosphorescent emitter (paragraph 47). The device also has an electron transporting layer containing BCP (2, 9-dimethyl-4, 7-diphenyl-1, 10-phenanthroline=bathocuproin) (paragraph 116). Tominaga also discloses that the electron transporting layer functions as a hole blocking layer which can efficiently inhibit the transport of holes (paragraph 17). The examiner notes the applicant mentions BCP as a suitable hole blocking material in the specification page 2. The structure of BCP is shown below:



BCP meets the criteria of  $Y=X$  where X is a nitrogen (N) which has a non-bonding electron pair and X stands for  $NR_4$ .  $R_4$  can be a mono or polycyclic aromatic ring system. The matrix material is not the same as the hole blocking layer.



BCP shows

Y is C

X is  $NR_4$

$R_1$  and  $R_2$  are different and are heteroaromatic rings

$R_4$  is a heteroaromatic ring

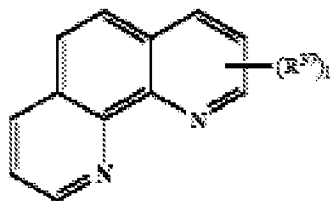
3. **Regarding Claims 3**, Tominaga discloses an organic electroluminescent device where the matrix material can include the compound represented by formula 3 (page 15):

5. **Regarding Claims 6-8**, Tominaga discloses matrix materials (hole blocking materials, paragraphs 17 and 116) that includes BCP (shown above). The structure of BCP includes two sp<sup>3</sup> hybridized carbon atoms (per claim 7) which are non-planar (per

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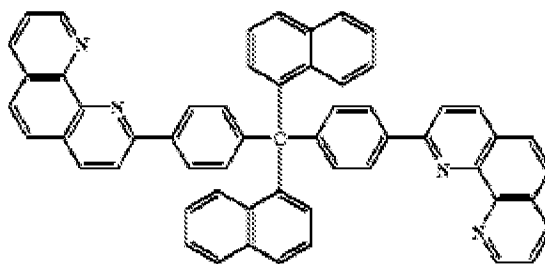
claim 6) and includes a  $sp^3$  hybridized carbon atom (per claim 7) that are secondary carbons (per claim 8) (paragraph 48).

6. **Regarding Claim 9**, Tominaga discloses that derivatives of the phenanthroline structure (i.e., BCP) have an electron transporting capacity (paragraph 22). Tominaga also discloses that the electron transporting layer functions as a hole blocking layer which can efficiently inhibit the transport of holes (paragraph 17).



phenanthroline structure (paragraph 29)

Tominaga discloses formula 4 (page 20) shown below:



Formula 4 represents a hole blocking material that contains a  $sp^3$  hybridized quaternary carbon substituent.

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7. **Regarding Claims 10 and 11**, Tominaga discloses an organic electroluminescent device that includes 9, 9'-spirobifluorene derivatives (paragraphs 61 and 69).
8. **Regarding Claim 12**, Tominaga discloses an organic electroluminescent device (paragraph 1) that includes matrix materials selected from carbazoles or organometallic complexes (paragraph 47).
9. **Regarding Claim 13**, Tominaga discloses that the device can include the following layers: anode/hole transporting layer/emissive layer/electron transporting layer/cathode. Tominaga also discloses that the electron transporting layer functions as a hole blocking layer which can efficiently inhibit the transport of holes (paragraph 17). The above structure shows the electron transporting layer (hole blocking layer) next to the cathode.
10. **Regarding Claims 14 and 15**, Tominaga discloses an organic electroluminescent device that contains phosphorescence emitters such as tris(2-phenylpyridyl) iridium (atomic number 77) (paragraph 47). The examiner notes that in the applicants' specification on page 10 that iridium is listed as a preferred metal.

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11. **Regarding Claim 16**, Tominaga discloses and organic electroluminescent device that contain phosphorescence emitters such as tris (2-phenylpyridyl) iridium (paragraph 47).

12. **Regarding Claim 17**, Tominaga discloses that the electron transporting layer functions as a hole blocking layer which can efficiently inhibit the transport of holes (paragraph 17) and has a glass transition temperature of at least 120 deg C. The applicant claims a glass transition temperature of greater than 100 deg C.

13. **Regarding Claim 18**, Tominaga discloses that the organic layers are made from sublimable compounds (paragraph 118).

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. **Claims 4, 19-22 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tominaga (US 2003/0168970).**



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15. **Regarding Claims 19-22**, Tominaga discloses that the organic layers can be formed by evaporation by resistance heating, electron beam evaporation, sputtering, molecular deposition, coating and the like. Tominaga fails to mention the exact coating methods claimed by the applicant.

Tominaga teaches the device claimed by the applicant with respect to the chemical limitations. The limitations with respect to the coating method is viewed as a process limitation.

If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” (In re Thorpe, 227 USPQ 964,966). Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to the applicant to come forward with evident establishing an unobvious difference between the claimed product and the prior art product (in re Marosi, 710 F.2<sup>nd</sup>, 802, 218 USPQ 289, 292 (Fed. Cir. 1983, MPEP 2113).

16. **Regarding Claim 4**, Tominaga discloses an organic electroluminescent device containing a hole blocking layer made of BCP (2, 9-dimethyl-4, 7-diphenyl-1, 10-phenanthroline=bathocuproin) (paragraphs 16 and 117). Tominaga fails to mention the percentage of BCP in the hole blocking layer. The applicant claims a concentration of at least 50%.

Hole blocking materials are used in hole blocking layers to confine the holes to the emissive region of the device to improve the emission efficiency. The amount of a hole blocking material present is viewed as a cause effective variable that controls the confinement of hole that affect the emission efficiency.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to have adjusted the amount of the hole blocking material present in hole blocking layer to optimize the blocking of holes which would have included the range claimed by the applicant, absent unexpected results.

17. **Regarding Claims 27-28**, Tominaga discloses an organic electroluminescent device that is a thin film organic multi-layered device.

An organic electroluminescent device is viewed as inclusive of the electronic devices mentioned in claims 27-28.

### **Response to Arguments**

Applicant argues that BCP (a hole blocking material) does not read on Formula 2 as R4 was not defined as forming a ring with R1 or R2 in claim 1.

The examiner counters that there is no proviso in the claim language which forbids R4 from forming a ring with R1 or R2. BCP shows X as a nitrogen atom and R4 as part of the ring system. R4 is defined in claim 1 as a monocyclic or polycyclic ring system. The examiner maintains that R4 as a part of a monocyclic or polycyclic ring system would be inclusive of BCP and read on the claim limitations.

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Applicant argues that the prior art fails to teach any of Formula(s) 1-4 as a hole blocking material.

As discussed above, the examiner maintains the BCP reads on Formula 2 and Tominaga discloses an organic electroluminescent device with an electron transporting layer containing BCP (paragraph 116). Tominaga also discloses that the electron transporting layer functions as a hole blocking layer which can efficiently inhibit the transport of holes. The examiner interprets this to mean that BCP is also a hole blocking material.

Applicant's arguments have been fully considered but they are not persuasive.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY CLARK whose telephone number is (571)270-7087. The examiner can normally be reached on M-Th 7:00 AM to 5 PM Alternating Fri 7:30 AM to 4 PM and Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/  
Supervisory Patent Examiner, Art Unit 1786

GREGORY CLARK  
Examiner  
Art Unit 1786